# BIO 384 Proteins Structure

## Summer 2024

**Course Credits:** 4
**Contact Hours:** 56 hours
**Instructor:** TBA
**Email:** TBA

## COURSE OBJECTIVES

This advanced course systematically examines recent developments in comprehending the molecular structure of proteins, with a particular emphasis on the interplay between structure and function. The scope encompasses proteins, carbohydrates, lipids, nucleic acids, and other molecules. Participants are urged to actively engage in substantive discussions, conduct critical analyses of contemporary literature, and apply advanced methodologies hands-on. This immersive educational experience is designed to cultivate a deep understanding of the continually evolving landscape within the discipline of structural biology.

Upon Completion of this Course, students will be able to:

1. Gain a thorough grasp of primary, secondary, tertiary, and quaternary protein structures.
2. Establish the connection between protein structure and biological function.
3. Familiarize yourself with cutting-edge methods in structural biology.
4. Understand the biological significance of protein structures in health and disease.
5. Apply theoretical knowledge to solve practical problems in protein structure determination and analysis

## PREREQUISITES

BIO 110 Introduction to Biochemistry Major, CHM 331 Advanced Organic Chemistry.

## GRADING

Grades will be determined by accumulating points, with 100 points being the maximum, as follows:

| ITEM | POINTS |
|---|---|
| Class Participation | 10 Points |
| Quizzes | 15 Points |
| Assignments | 15 Points |
| Midterm Exam | 20 Points |
| Final Exam | 40 Points |
| Total | 100 Points |

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

A ≥ 90 > B ≥ 80 > C ≥ 70 > D ≥ 60 > F.

We reserve the right to make adjustments to the overall grading policy.

## COURSE MATERIALS

**Required Texts:**

Arthur M. Lesk. (2004), ***Introduction to Protein Science: Architecture, Function, and Genomics*** , Oxford University Press.

**Recommended (Optional) Texts or Other Materials:**

1. G. E. Schulz, R. H. Schirmer. (1979), ***Principles of Protein Structure***, Springer.
2. Gregory A. Petsko, Dagmar Ringe. (2003), ***Protein Structure and Function***, Oxford University Press.

## COURSE TOPICS

| MODULE | TASKS |
|---|---|
| Module 1 | **Topics:**<br>Topic 1: The ribosome—the fulcrum of genomics.<br>Topic 2: The biological context of protein synthesis—the basis of evolution.<br>Topic 3: Genomics and proteomics.<br>Topic 4: Gene sequences determine amino acid sequences, amino acid |

| | |
|---|---|
| | sequences determine protein structures.<br>**Assessments:**<br>Quiz#1<br>Assignment#1 |
| Module 2 | **Topics:**<br>Topic 5: Protein folding patterns and modular structure.<br>Topic 6: Protein expression patterns in space and time: proteomics.<br>Topic 7: Computing in protein science.<br>Topic 8: Spectroscopic methods of characterizing proteins in solution.<br>**Assessments:**<br>Quiz#2<br>Assignment#2 |
| Module 3 | **Topics:**<br>Topic 9: Protein structure determination.<br>Topic 10: Protein-ligand interactions.<br>Topic 11: Catalysis by enzymes.<br>Topic 12: Control of protein function: allosteric regulation.<br>**Assessments:**<br>Midterm |
| Module 4 | **Topics:**<br>Topic 13: Classifications of protein folding patterns.<br>Topic 14: Changes in proteins during evolution give clues to the roles of residues at different positions.<br>Topic 15: Classification of protein functions.<br>Topic 16: Protein engineering, folding, prediction, and design.<br>**Assessments:**<br>Quiz#3<br>Assignment#3 |
| Module 5 | **Topics:**<br>Topic 17: General properties of protein-protein interfaces.<br>Topic 18: Protein-DNA interactions.<br>Topic 19: Some protein-DNA complexes that regulate gene transcription.<br>Topic 20: Proteins in disease.<br>**Assessments:**<br>Final Exam |

## ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

## LEARNING REQUIREMENTS

1) Late assignments are not acceptable and are subjected to grade deductions.
2) Assignments submitted in the wrong format will be counted as not submitted.
3) Failure to submit or fulfill any required course component results in failure of the class.
4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

## TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

## ACEDEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university

administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

## DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.